Cisco Networkers 2009
January 26-29 Barcelona, Spain

Video Networking Architecture and the Connected Home

BRKVID-2005

Ivar Beljaars

Sr Business Development Manager – Connected Home

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Housekeeping

- We value your feedback- don't forget to complete your online session evaluations after each session & complete the Overall Conference Evaluation which will be available online from Thursday
- Visit the World of Solutions
- Please remember this is a 'non-smoking' venue!
- Please switch off your mobile phones
- Please make use of the recycling bins provided
- Please remember to wear your badge at all times including the Party

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Agenda

- Cisco’s Vision on a Video Enabled Connected Home
- Scope of the Connected Home
- Quality of Experience in the Connected Home
- Connected Home Architectures & Design
- Management of Connected Home Services
- Connected Home Portfolio and products future's

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Vision on a Video Enabled Connected Home

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Bundled Services are not yet Converged and are Complex

Home Networking 1.0 is primarily concerned with productivity:

- Access to the Internet
- Share an internet connection
- Do office work at home and homework for school
- Use network to share printers

However, it was not "living room friendly"

- No innovative Industrial Design
- Not easy to install
- Difficult to manage
- Content stored in many different locations and formats
- Comprised of independent devices that may or may not work together

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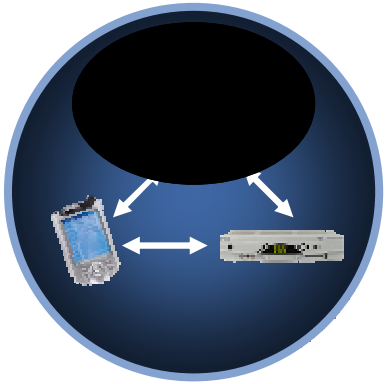
Next Generation Home Network is Being Formed by New Market Dynamics

Broadband IP Platform

New Business Models

Waves of New Consumer Applications



New Consumer Requirements

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Home Networking 2.0 is the Next Wave of the Connected Life

HN1.0

HN2.0

Services enabled by HN2.0

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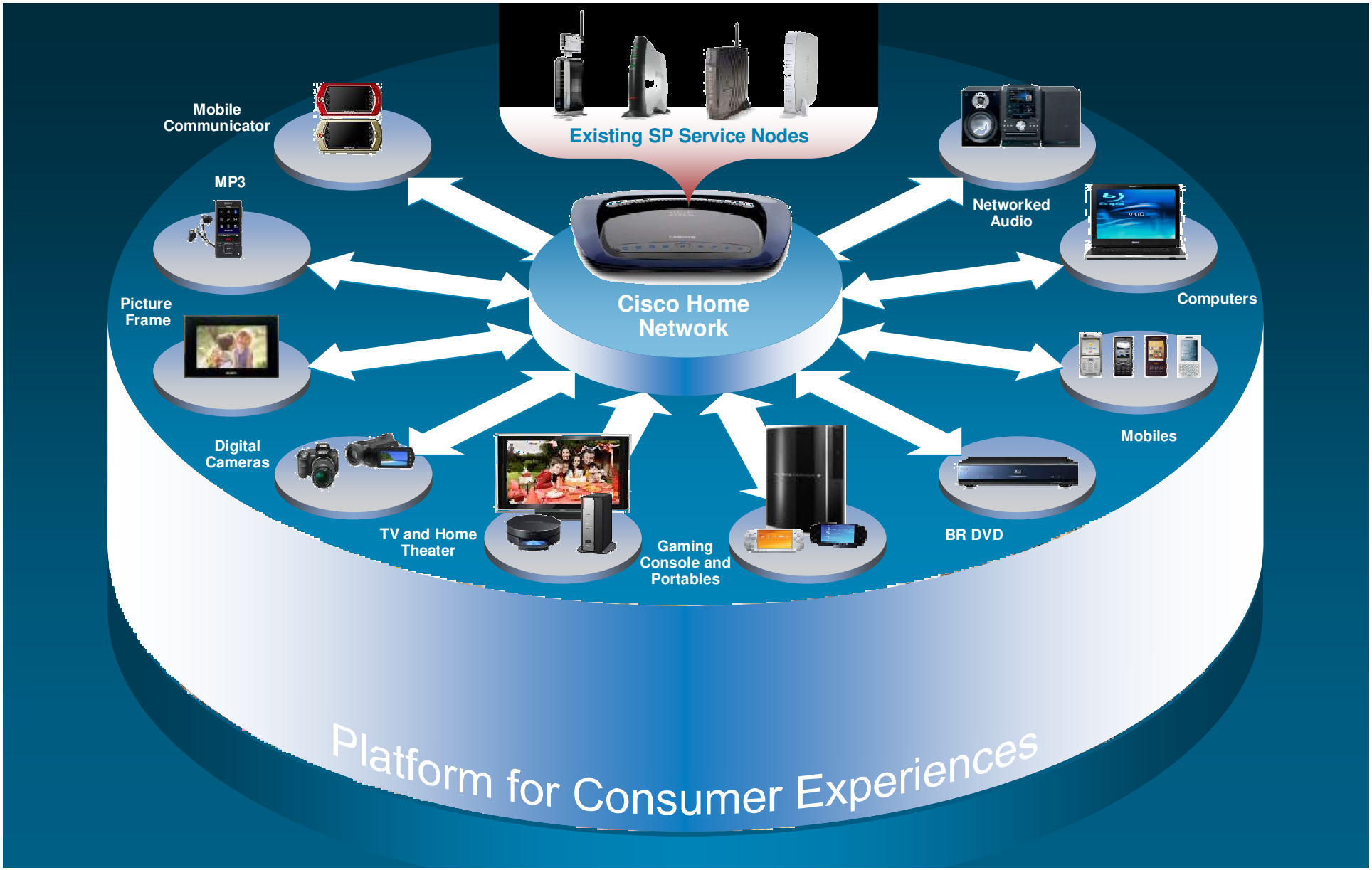
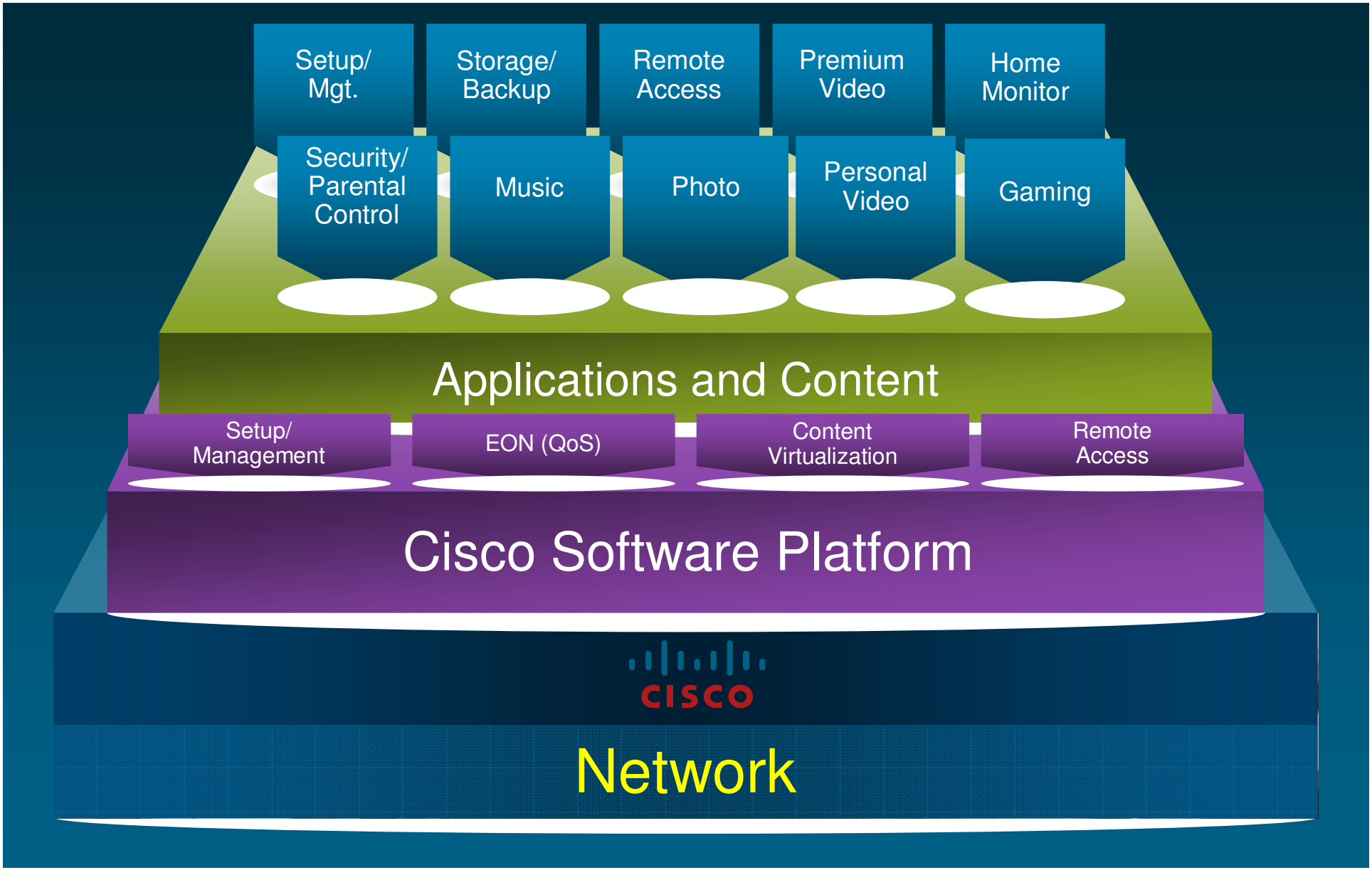
From Device Centric to Network Centric



The Network as the Platform in the Home



Scope of the Connected Home

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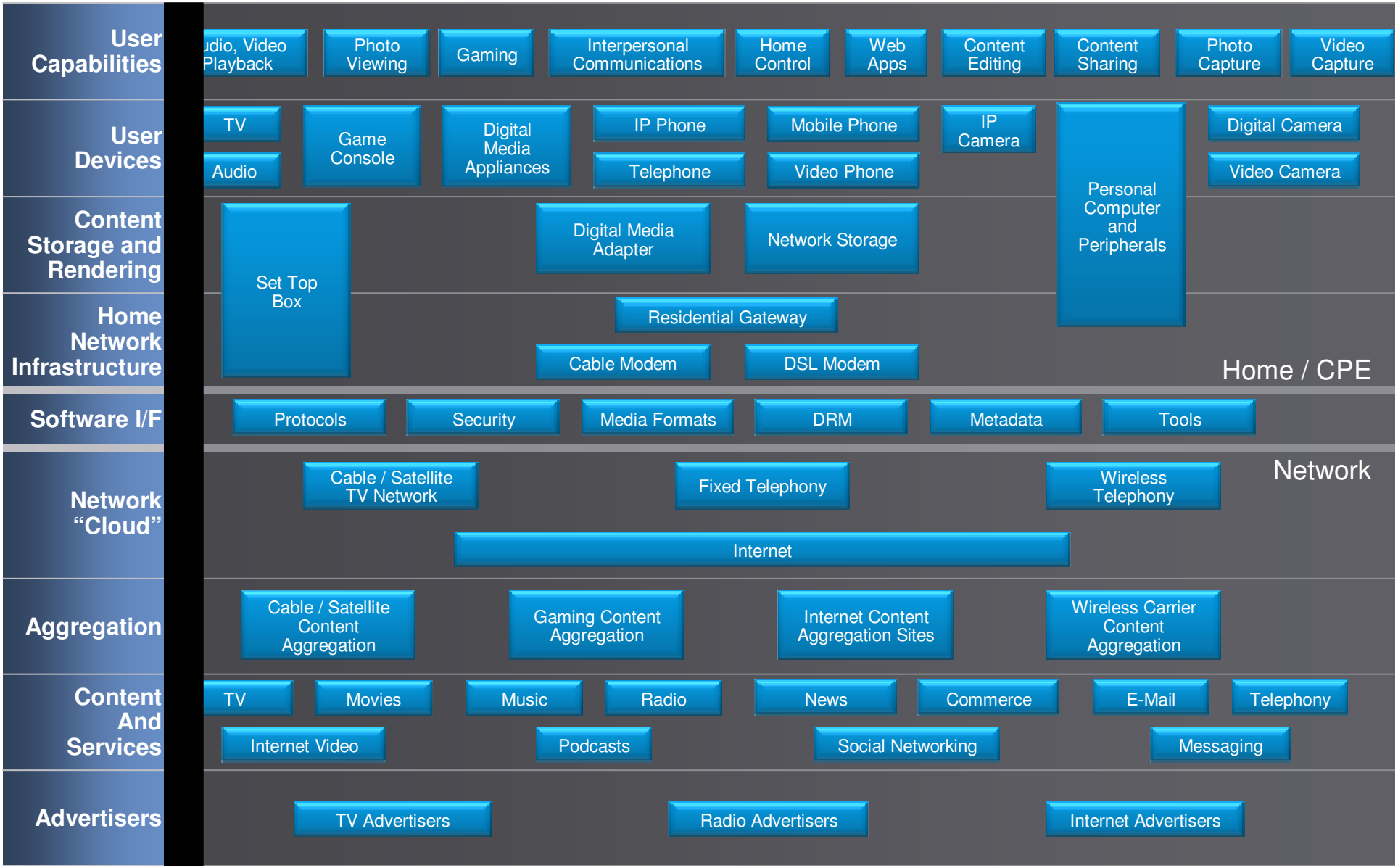
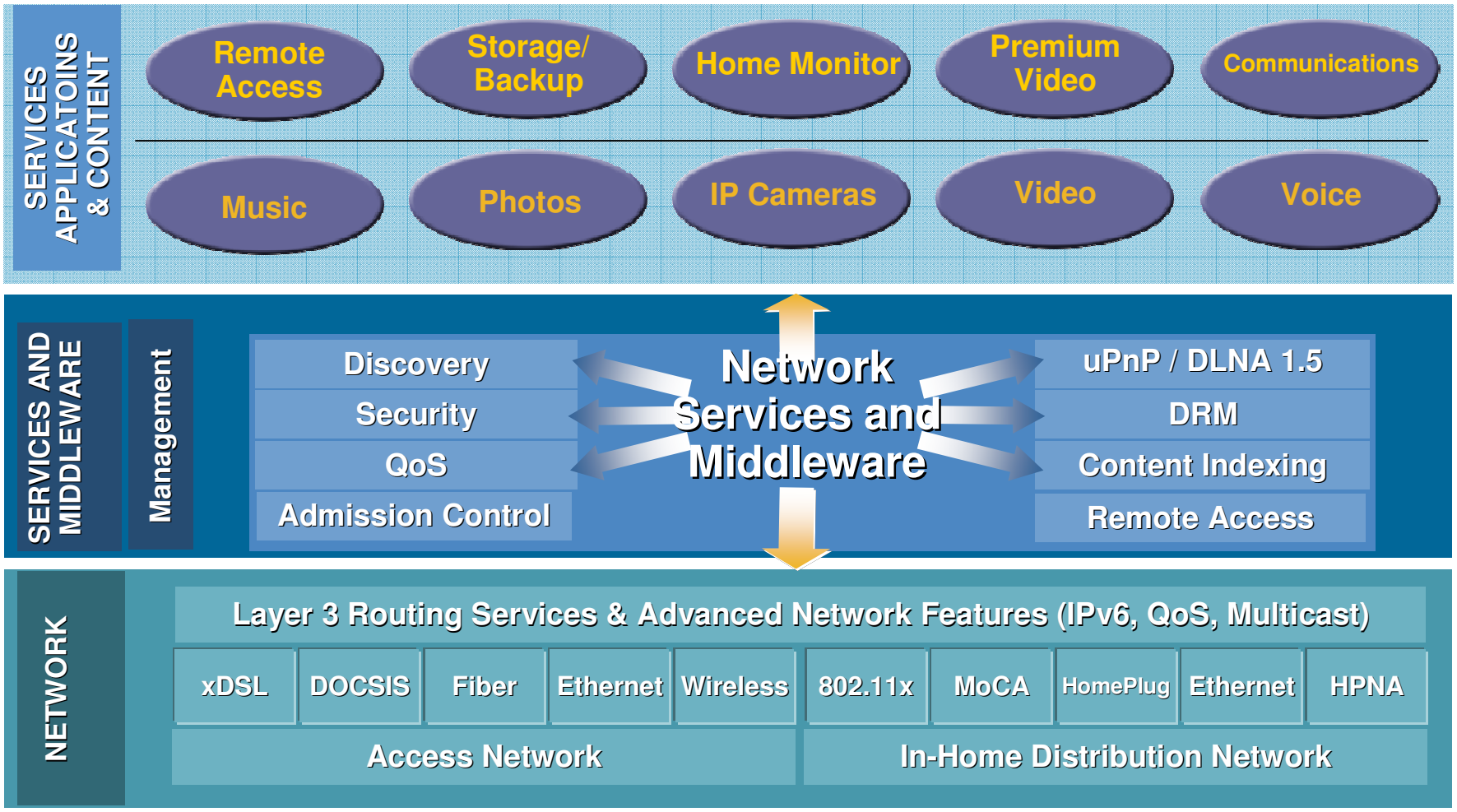
Connected Home House of Cards

Complexity Stifles Consumer Purchase Decisions & Experiences



Connected Home Architecture



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Quality of Experience

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Foundation for Unified Personal Service Delivery

Current State

Future State

- Unified User Interface Generation by leveraging Embedded Adobe Flash™/Flex™ Technology
- Centralize Application & Content Management on potential series of devices
- Integrated On-Line Personal Services into the same platform for scalability, consistency and ease of use

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Role of Content in the Home

- The Connected Home becomes one big Content Source
- More and more Content Generating Devices , mobile phones, cam's etc
- Social Networking drive need for Content Streaming of Home Grown Content in the Home

- Content Virtualization & Indexing required to help the consumer use content flexibly
- Central Storage Function in the Connected Home for personal content
- Optimized Content Streaming and handling of DRM in the Home

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Quality of Experience

- Common Mistakes with the definition of Quality of Experience
  - Quality of Service = User Experience
  - Quality of Service = User Preference
  - Quality of Service = Use Case
  - Quality of Service = Owned by Service Providers
  - Quality of Service = Does not have interest of Consumers
  - Quality of Service = Consumers are willing to pay for

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User Experience in Video Use Cases

- Examples

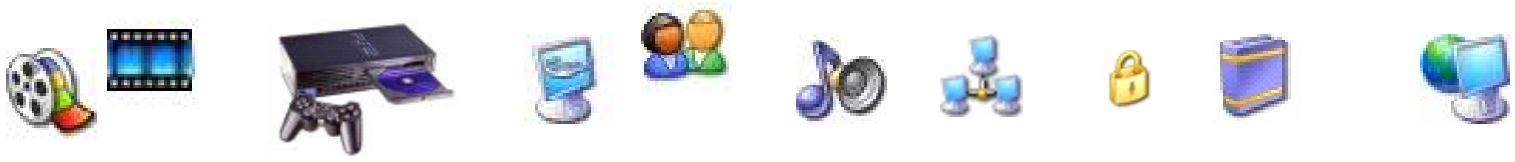
  I have a Video File on my PC and want to view on another PC

  I have a Video File on my PC and want to view on my TV in the Livingroom

  I have a Video File on my PC and want to view on my TV in the Master Bedroom

  I have a Video File on my WiFi enable Mobile Phone and want to store it on my NAS

  I have a Video File on my Mobile Phone and want to view on my TV in the Livingroom



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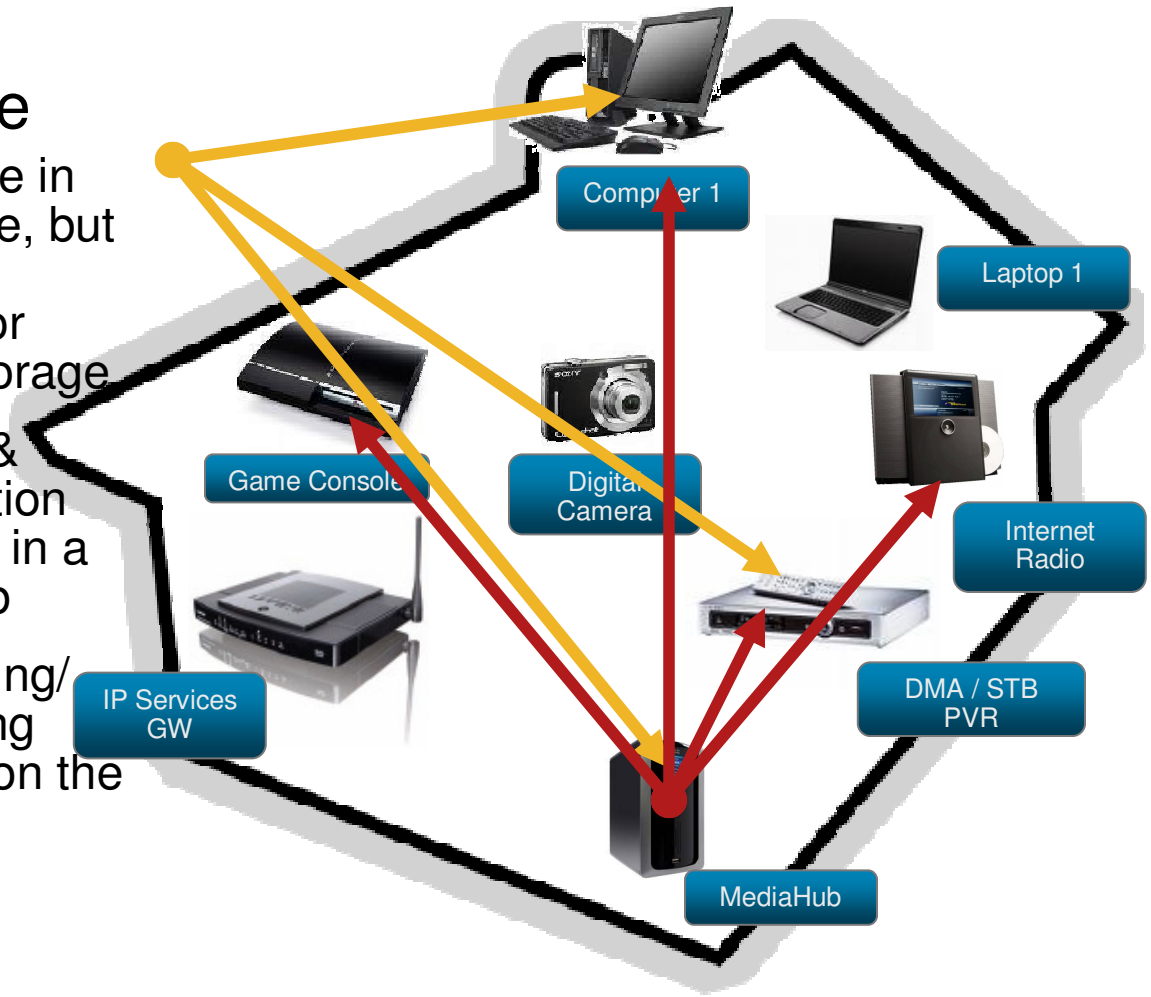
Content Storage & Streaming in the Home

Storage

- Can reside in any device, but primary devices for central storage
- Indexing & Virtualization optimized in a MediaHub
- Transcoding/ Transrating Services on the Fly



Streaming

- UPnP
- DLNA 1.5
- From Central Storage Device

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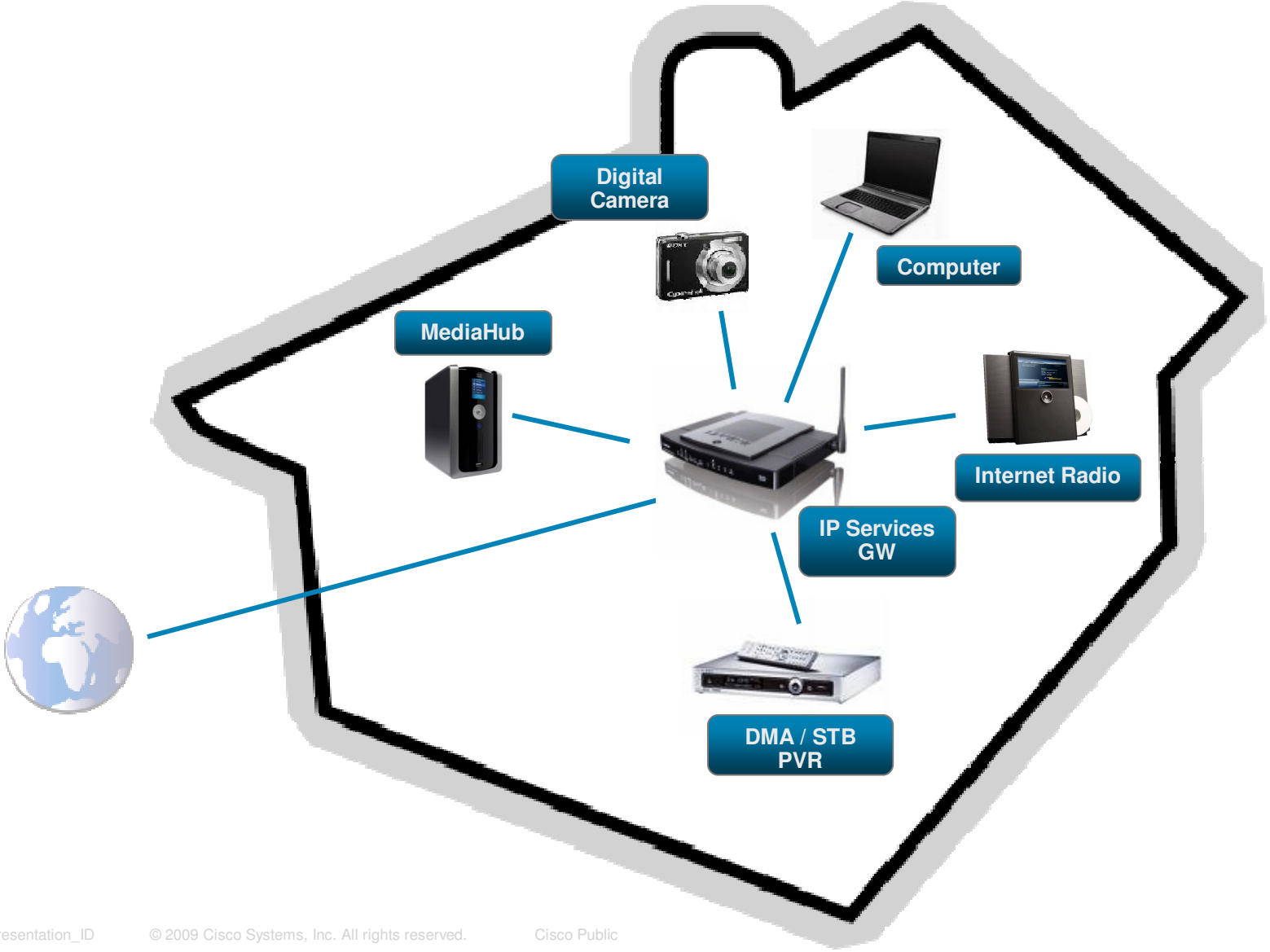
Video Enabled Connected Home example



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Connected Home Architecture & Design

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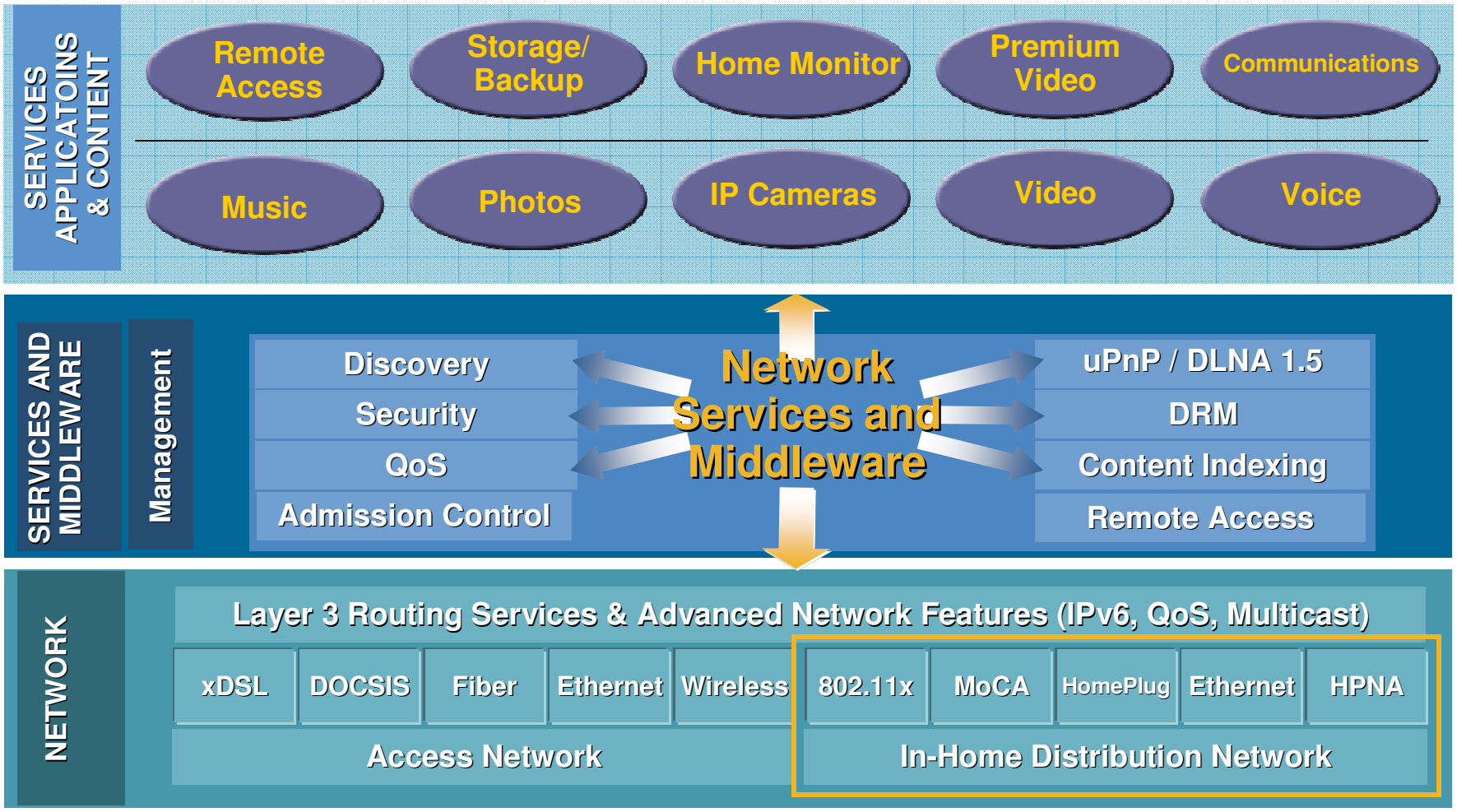
Connected Home Architecture



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Connected Home Design Considerations

- Video Services, Content Streaming and Social networking drive the need for more bandwidth and control
- Coverage and range should be the 1st and major concern
- Importance of Speed is only relevant if there is connectivity!
- Caveats with Usage Model
  - Connectivity
  - Dead spots
  - Building structure
  - Bandwidth
  - Reliability
  - Error rates

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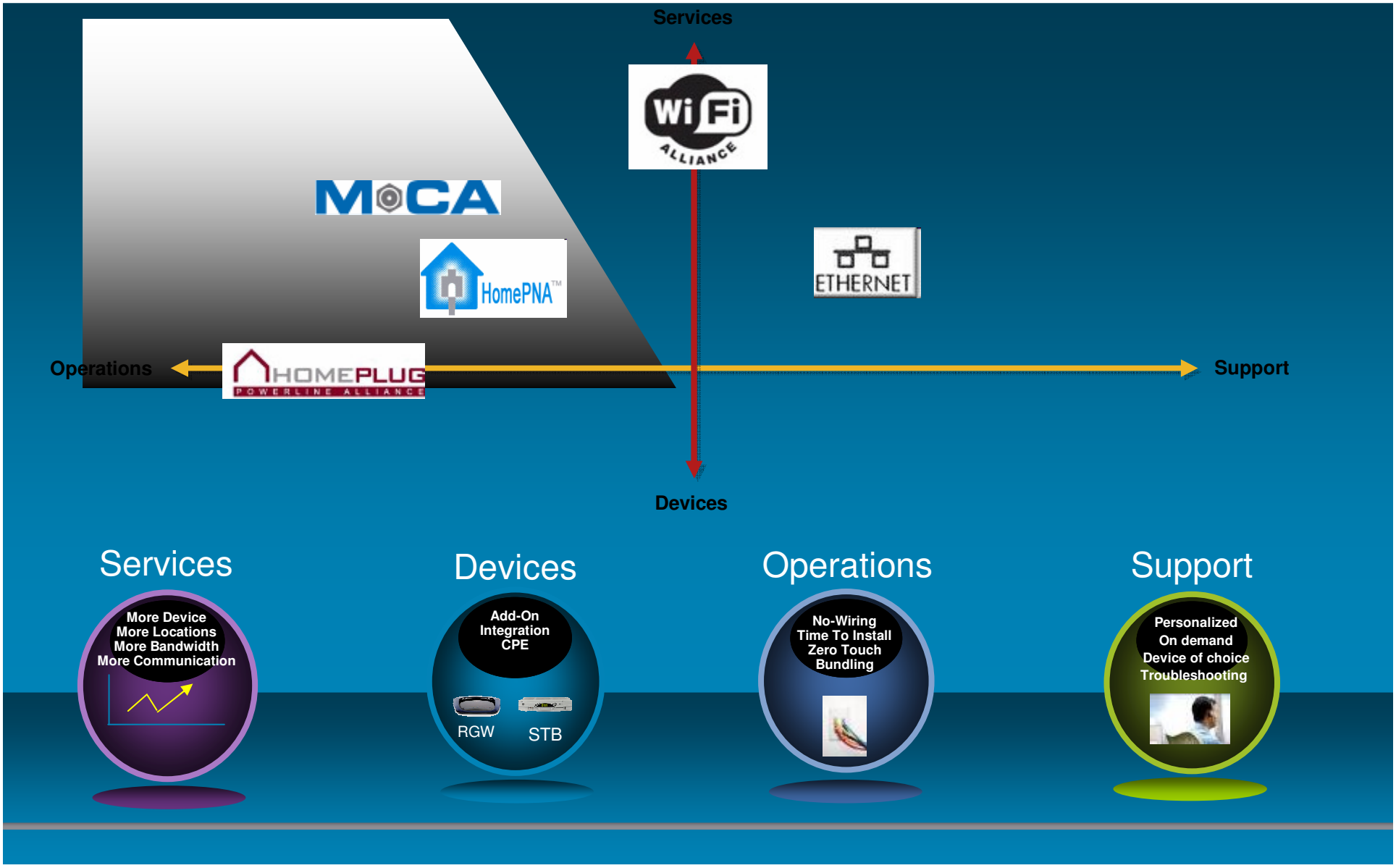
Home Networking Design Consideration
Key Technologies



Home Networking Technologies

	Wi-Fi Alliance	MoCA	HomePlug Powerline Alliance	HPNAv3
Max PHY Data Rate	300 Mbps today, 600 Mbps tomorrow	270 Mbps	200 Mbps today, 600 Mbps tomorrow	240 Mbps
Likely Usable Throughput Range	30-170 Mbps	57-125 Mbps	50-70 Mbps	~ 80 Mbps
Reliability	Some homes have unpredictable wireless characteristics	90% of homes received 90 Mbps or more based on field trials	Throughput depends on loop length and home power line condition.	Re-emerged through support from AT&T
Physical Medium	Wireless	Coax	Power Lines	Twisted Pair/Coax
Status	Final standard expected CY09. Products available today.	Standard Finalized. Products available today	Standard Finalized. IEEE 1901 (Dec 08) Products available today	Standard Finalized. Products available today

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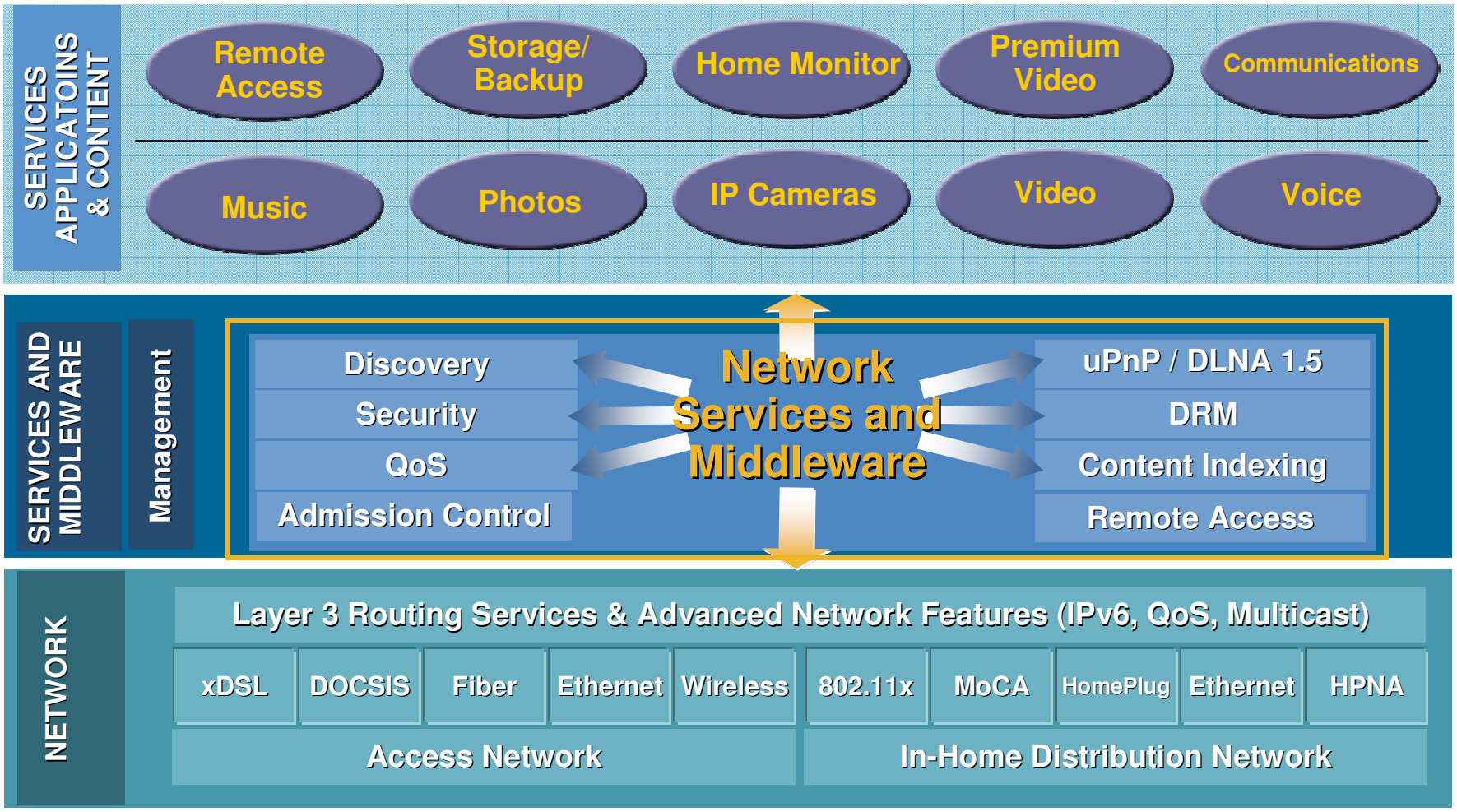
Connected Home Architecture



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Content Virtualization

- Crawl and index Media Content from devices on the LAN
- Serve aggregated content to device on the LAN or WAN using Remote Access

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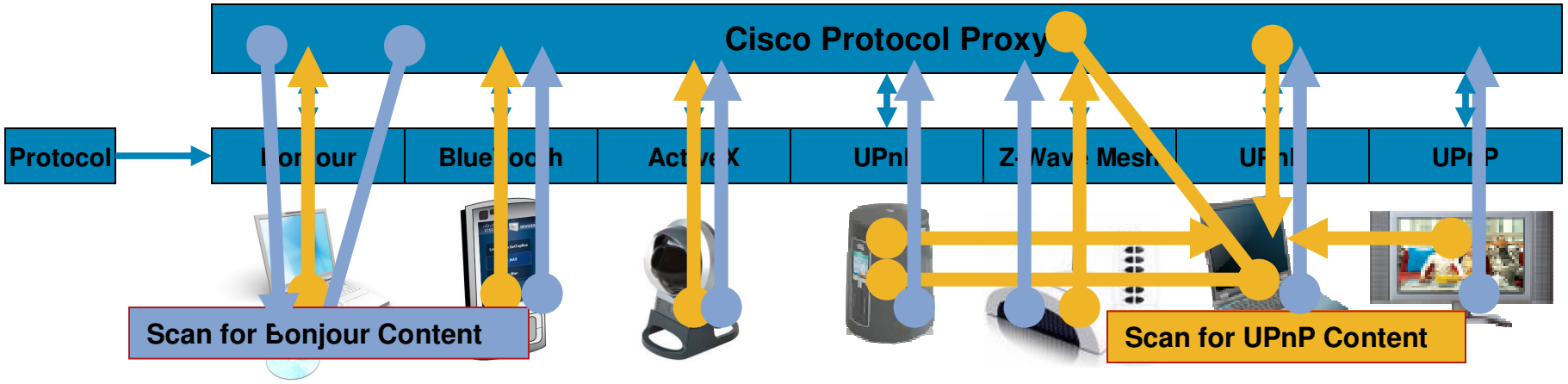
Our Network - Content Virtualization through Protocol Interoperability



Device	Laptop	Cell Phone	IP Camera	NAS	Home Sensor	Laptop	TV
Vendor	Apple	Nokia Motorola Samsung LG	Linksys D-Link NetGear …..	Cisco D-Link NetGear Lacie	D-Link Linksys ZenSys	Dell HP IBM Acer	Philips Samsung Pioneer Sony

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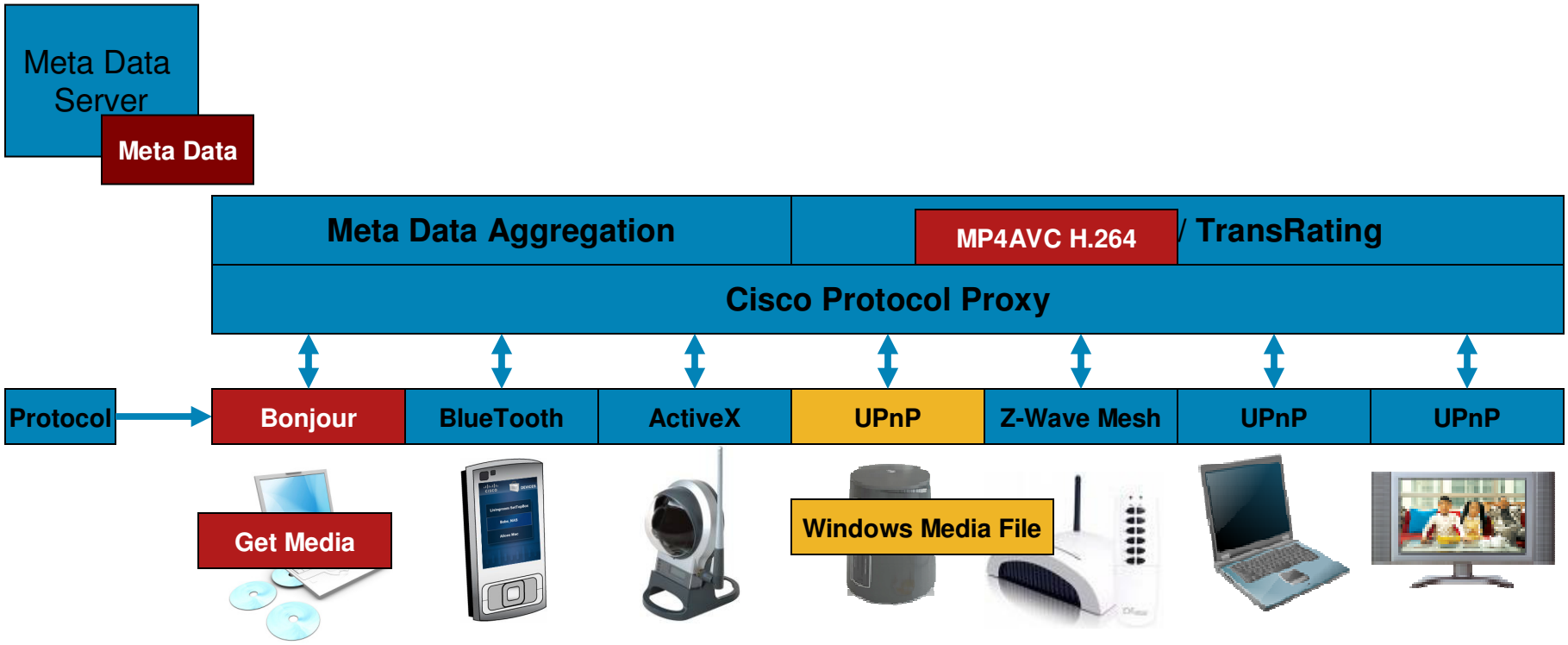
Our Network - Content Virtualization through Protocol Interoperability



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Management of Connected Home Services

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Management of the Home for SPs

Management for Service Providers

BBF Forum , TR-069 Based
- Remote Management
- Std Data Models for variety of devices
- Support SP Supply Business Model Only

Challenges for BBF implementations
- Proprietary Vendor Specifics
- Support Retail Devices
- Non-IP Managed Devices
- Diagnostics
- Customer Self Care

Self-Care for Consumers

Consumer is willing to do Self-Care, negative experience with call centers.

Consumer Challenges
- Devices do NOT provide visible diag…
- Problem could reside anywhere
- Lack of tools and source for info
- PC Centric Tools available but complex

Reduce OPEX and Increase customer satisfaction

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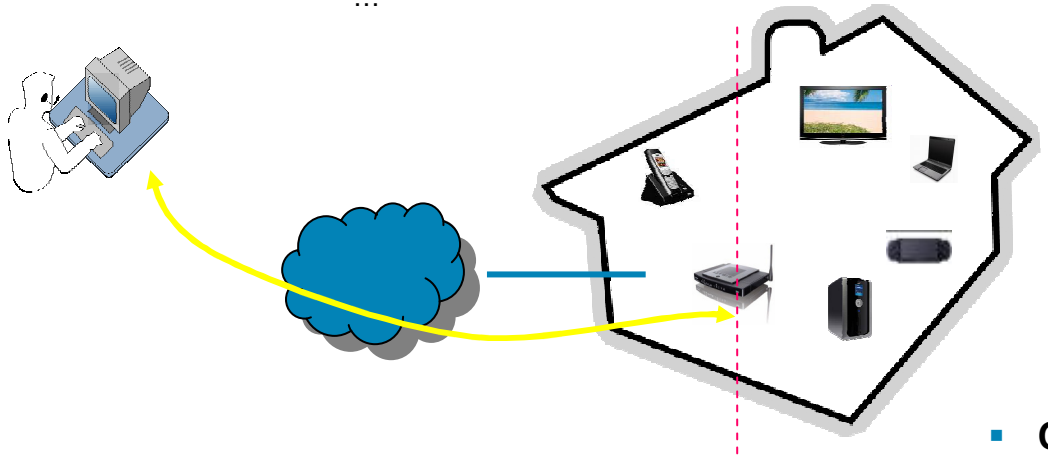
Management of the Connected Home

- **Service Provider Objectives**
  - Service Activation
  - Low Support Cost
  - Firmware Upgrades
  - Remote Control
  - …



- **The challenges for Operators**
  - Cost of Management & End User Support
  - Scalable Solution for managing millions of end customers
  - Increased ^3 on remote devices beyond the Gateway
  - Standard Implementations
  - Cross Vendor Support

- **Consumer Satisfaction**
  - Easy to Install
  - Easy to use
  - Remote Assistance
  - Self-Care
  - Cross Platform Support

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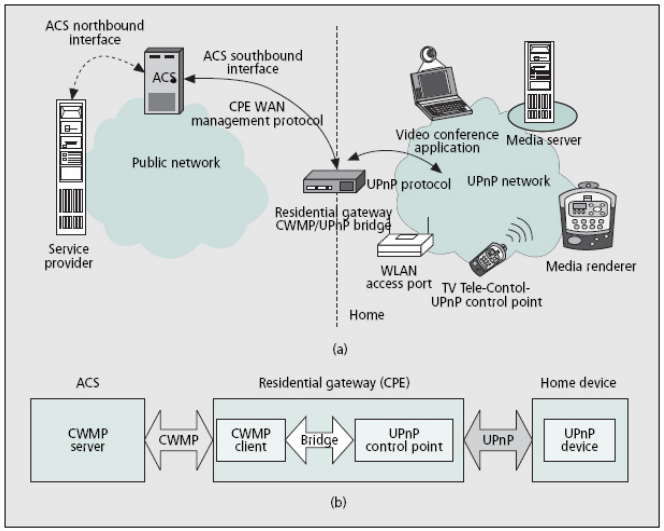
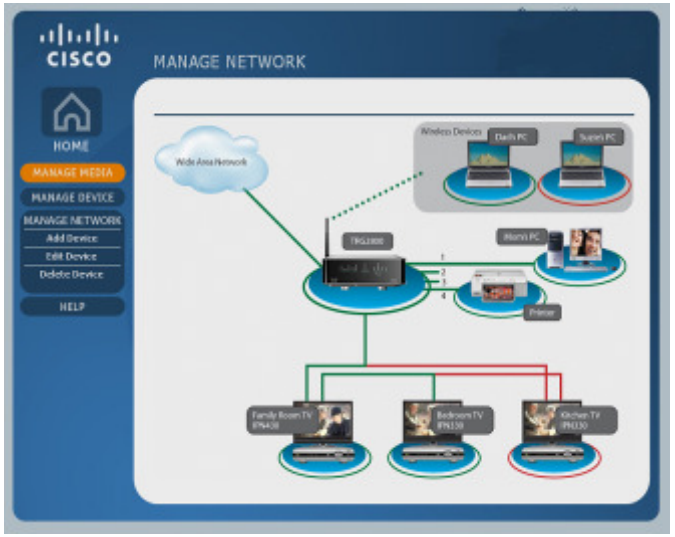
Home Network Management
Bridging LAN and WAN management approaches

- **Residential Gateway**
  - Auto-discovers in-home network topology and devices.
  - Bridges WAN based management protocols to the home network
  - Extends reach to mange in-home devices
- **Firmware and Software Management**
  - Firmware Upgrade
  - Software Provisioning (install/upgrade/uninstall)
  - Software Management/control (Start/Stop)
- **Device Configuration**
  - Device Configuration
  - Backup & Restore
- **Diagnostics and Performance Monitoring for devices and home network links**
  - Device Diagnostics
  - Link Diagnostics
  - Performance Monitoring



Reference: ***Nikolaidis et al. IEEE Communications Magazine October 2007***



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Easy Set-Up and Management

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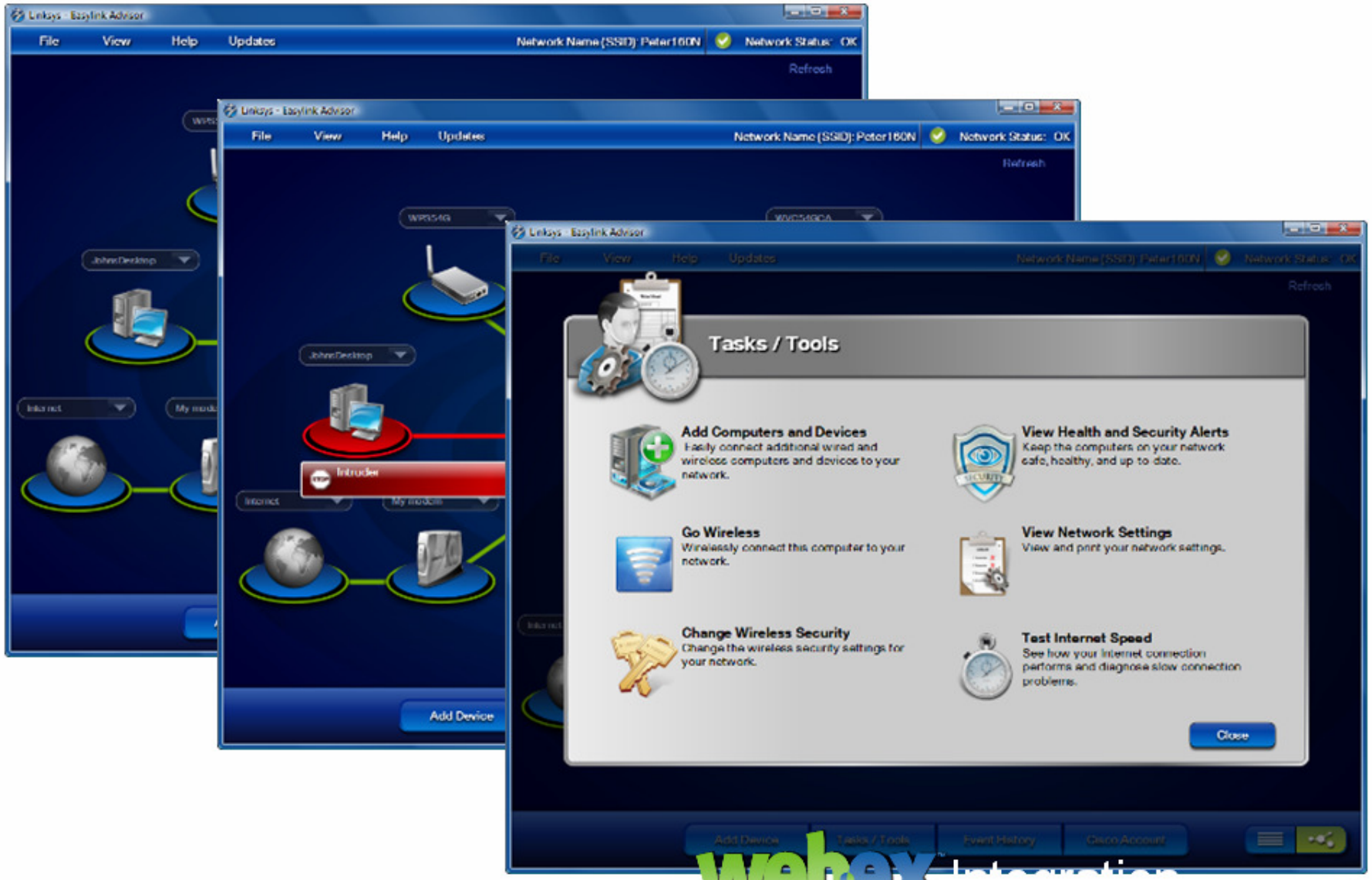
Easy Set-Up and Management



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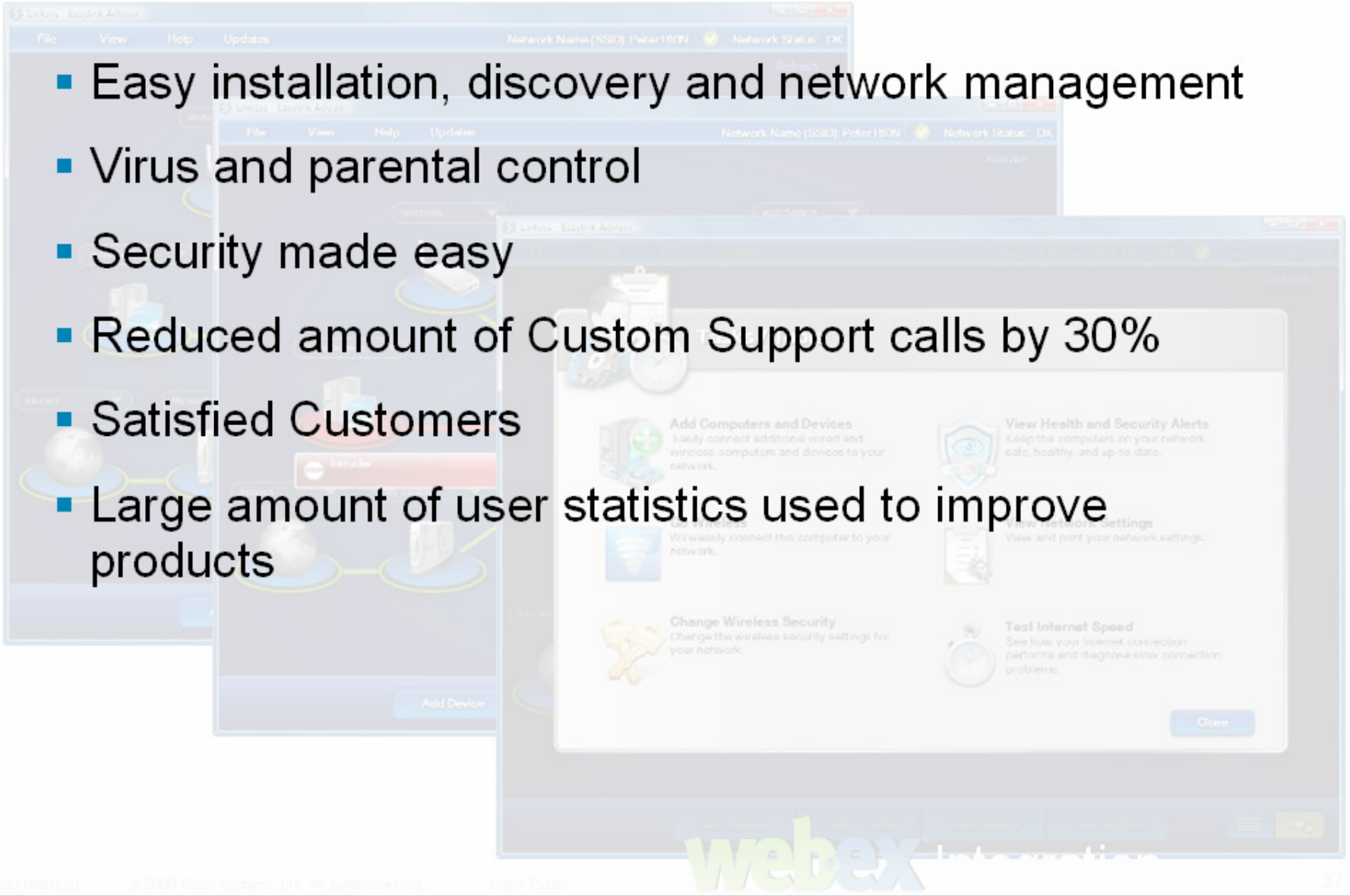
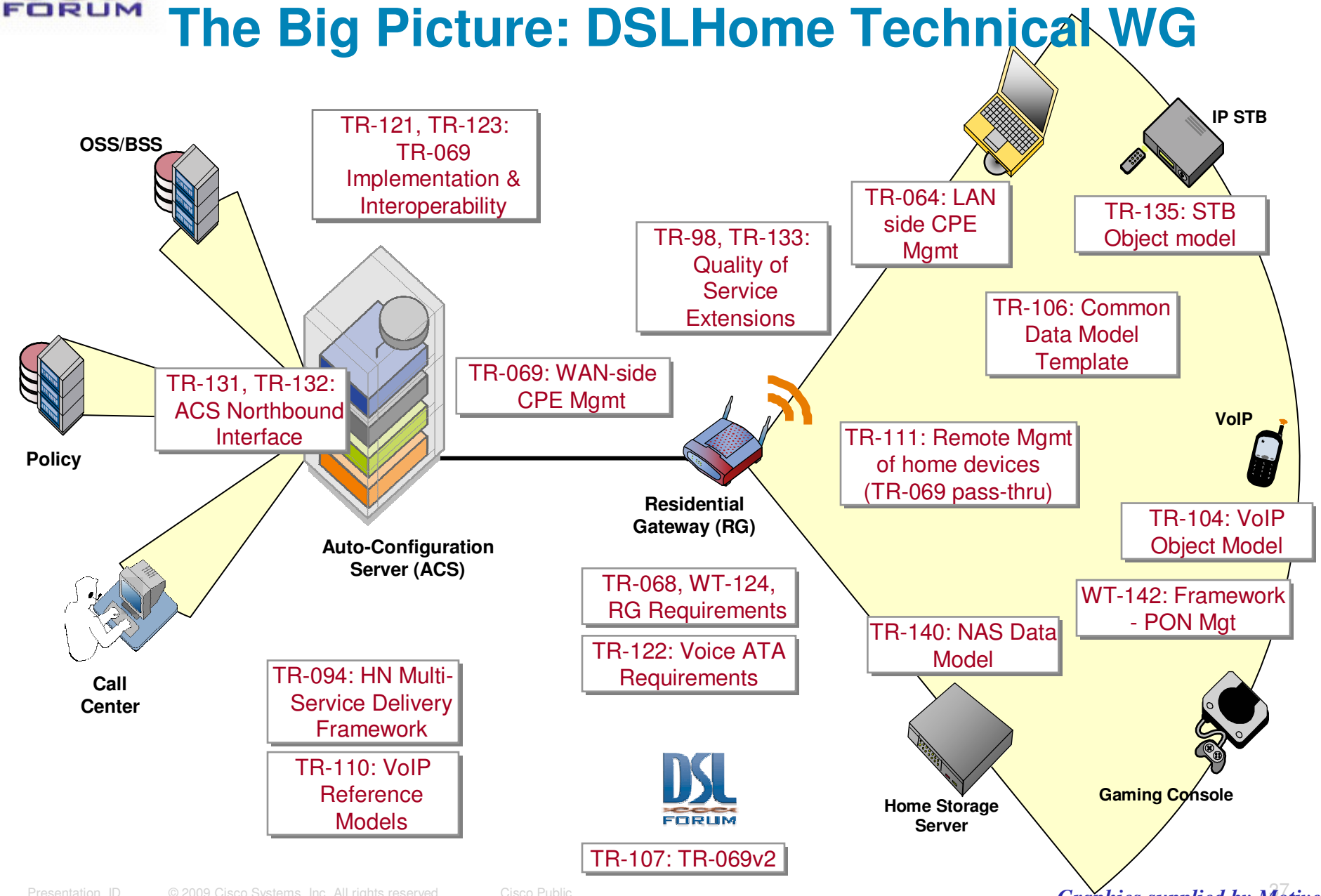
Easy Set-Up and Management



- Easy installation, discovery and network management
- Virus and parental control
- Security made easy
- Reduced amount of Custom Support calls by 30%
- Satisfied Customers
- Large amount of user statistics used to improve products

The Big Picture: DSLHome Technical WG



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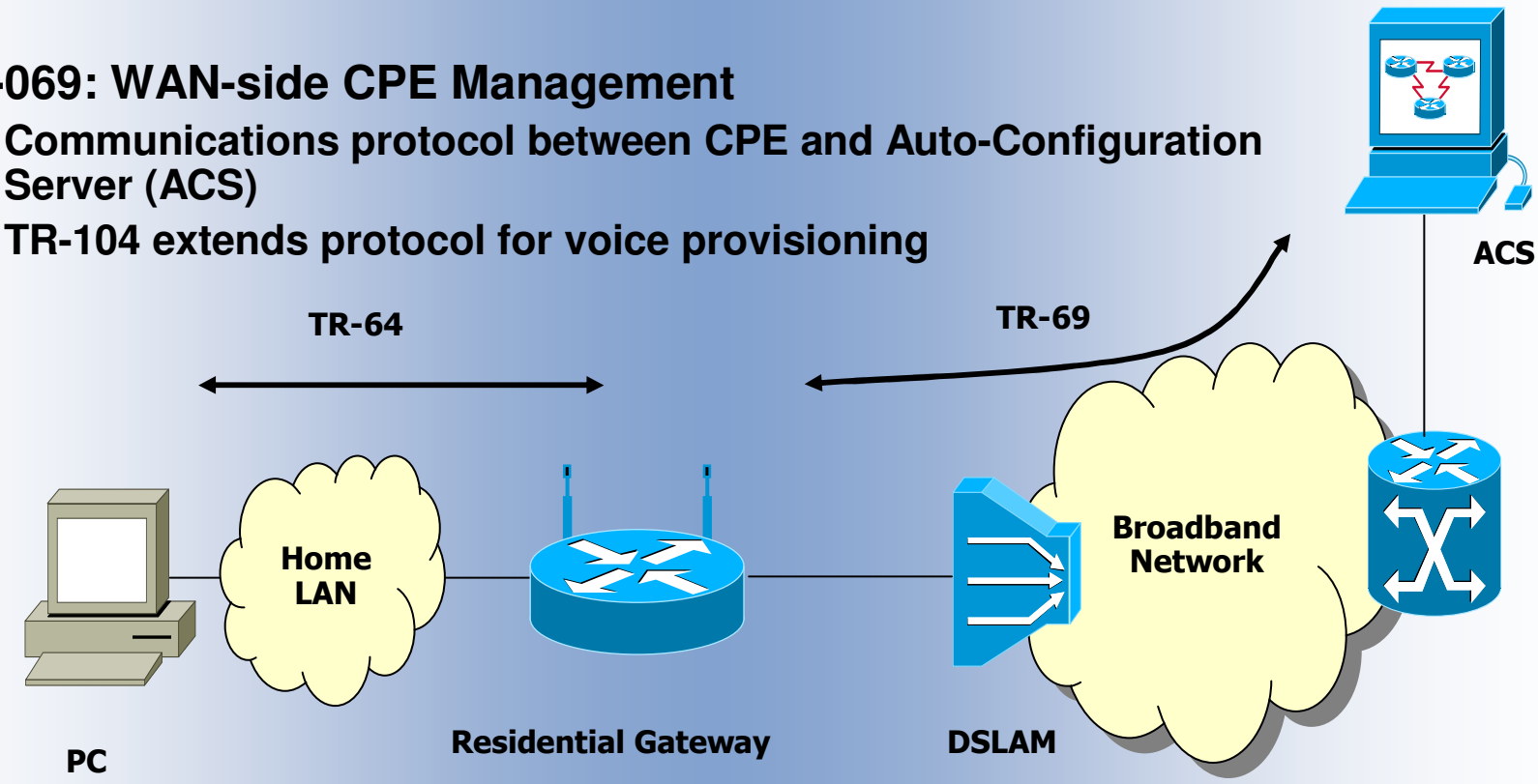
DSL/Voice CPE Management Overview

- **TR-064: LAN-side CPE Configuration**
  - **UPnP compatible solution for management**
- **TR-069: WAN-side CPE Management**
  - **Communications protocol between CPE and Auto-Configuration Server (ACS)**
  - **TR-104 extends protocol for voice provisioning**



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TR-069 CPE Management Capabilities

- CPE Discovery and Authentication
- Configuration Management

  Pre-provision device “template” before subscriber does self-install

  Provide initial configuration to CPE

  Perform ongoing configuration checks and update

  Change configuration as new services are added
- Firmware Management

  Continuing version verification

  Remote firmware update based on SP determined rules
- Customer Support

  Diagnostic, performance, and status information from CPE

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Connected Home Product Future Directions

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New Product Leadership

Media Hub

- Virtualize all of your digital music library, photos, and videos
- Access all your content throughout your home
- View and listen to your all of your digital photos, music and videos
- Automatically backup your PCs and laptops
- Remotely access your pictures, music and videos from anywhere in the world through an internet browser

Wireless Home Audio

- Unlock your digital music, iPod, and Internet music from your PC and stream it to any room
- WiFi touch-screen controller puts millions of songs at your fingertips
- Full range of products, built on industry standard Wireless N and UPNP

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Media Hub

- Virtualize all of your digital music library, photos, and videos
- Access all your content throughout your home
- View and listen to your all of your digital photos, music and videos
- Automatically backup your PCs and laptops
- Remotely access your pictures, music and videos from anywhere in the world through an internet browser
- Very Low Noise Level
- Extreme Focus on Ease of Use

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Media Hub 410 (NMH410)

- Pre-Installed 1 Terabyte (TB) hard drive, and one extra hard drive slot for expansion
- Features LCD interface and flash memory card slots for direct copy of Digital Media allowing PC-less copy from Flash Media Reader to NMH410's internal disks
- Centralized storage of digital photos, music, video, and other files
  - No need to remember which PC has a specific photo or song
  - Accessible by any PC connected to your home network
- Allows playback on any PC connected to your home network
  - DLNA 1.5 certified and Streams media to Xbox 360 and UPnP DMA
- iTunes users can stream media content from the built-in iTunes sharing server on the NMH
- Expand storage by adding additional internal SATA hard disk or external USB hard drives
- No dedicated PC required
- Automatic or on-demand backup of PCs
- Access to NMH from outside your home (remote access)
- FCS Date December 30, 2008

NMH400 Series

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Whole Home Audio

- Listen to your favorite Music in wirelessly in every room
- Enjoy the freedom of Internet Radio Stations
- Plays all types of Audio Music Formats incl your favorite iTunes
- Various models for every type of home environment
- Interactive and Intuitive user experience in selecting your Audio
- Easy to use and expand your Digital Entertainment

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Wireless Home Audio

Controllers/Players

DMC350 Conductor

DMC250 Director

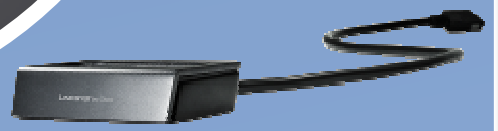
DMP100 Player

Accessories

DMSPK50 Speakers

DMRIR500 IR Remote

DMRW1000 Wireless-N Controller



MCC-i40 Docking Station for iPod

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Cisco Media Player / Cisco Media Server

Application suite sets up and controls your WHA ecosystem by indexing your PC music library, and managing multiple zones in your home

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